



National scale impact of the Stockholm Royal Seaport project

Background:

Smart grids are the future electrical grids. Smart grid often refers to the driver to make the electrical system more environmental friendly and improve the markets functionality. In order to accelerate innovation in smart grid and technology applications, pilot projects have been employed throughout the world. One pilot project in Sweden is the Stockholm Royal Seaport project.

Stockholm Royal Seaport is an urban development project for a planned expansion of housing and services that will take place in the district of Hjorthagen in Stockholm [1]. The Stockholm Royal Seaport project has been designated as one of 18 projects in the world supported by the Climate Positive Development [2]. The projects are selected to show that cities can reduce carbon emissions and facilitate climate-friendly growth.

The Royal Seaport aims to develop a smart grid for integration of consumers and producers into the electrical grid. The Royal Seaport Smart Grid concept includes load balancing and demand-response control in a smart grid that contains irregular consumption and renewable generation. The main actors in the Royal Seaport Smart Grid are ABB, KTH and Fortum. This master thesis project will be a collaboration between KTH and Fortum.

A pre-study for the Stockholm Royal Seaport project was performed 2010-2011 [3,4]. In [3,4] market models that support a development towards an energy system with active consumers resulting in a more efficient use of the system and less environmental impact are presented. An active consumer might be a household that choose to postpone starting the dishwasher if the hourly electricity price is high. These new market models will be tested on voluntary households in the Royal Seaport area. The electricity price that the consumers face consists of different components such as tax, retail price and a network tariff. The retail price originates from the demand and supply of electric energy available in the system. The network tariff is related to the cost due to the transmission of the electricity to the consumer. The developed market models are both for the retail price as well as for the network tariff.

The aim with testing the new market models is to investigate their impact on energy consumption and load shifting which have been formulated in the "Active customer" scenario and corresponding hypotheses listed in [3]. The next step in the Stockholm Royal Seaport project is to develop a method to aggregate the results from the project to a national impact.

Aim with the Master thesis project:

The objective with this Master thesis project is develop a method to transfer the results from the project into a national impact. Also a sensitivity analysis of the assumption made to aggregate the results to national scale will be carried out.

Tasks in the Master thesis project:

The Master thesis project can be divided into three tasks:

- 1) Develop a method to generalize the results from the Stockholm Royal Seaport project to a national scale considering the specific conditions in the pilot project. Assume that the market models will make the hypotheses formulated in “Active customer” scenario true. What impact would it be on a national scale when assuming today’s conditions such as the level of small scale production and price sensitivity among households?
- 2) Develop a concept for how a sensitivity analysis can be carried out. In the sensitivity analysis the impact of possible future developments will be analyzed. The developments will be formulated in scenarios. These scenarios can specify for example different levels of small scale production and different levels of price sensitivity among households. For each scenario the impact for the results on national level will be investigated.
- 3) Summarize the Master thesis report in a scientific paper that will be submitted to an international conference.

The Master thesis project is expected to start in the beginning of September 2012. The project has short deadlines and therefore demands a student to be able to work full time.

Qualifications:

Electrical Engineering students or other engineering students are welcome to apply. Furthermore, good oral and written communication skills in English are required. Since some of the statistics needed for the national impact analysis are in Swedish, it is good if the applicant can read Swedish. However, the Master thesis report will be written in English with a Swedish summary.

Application:

The application shall include a CV, a short personal letter and transcripts of finished courses.

The application is sent to:

karin.alvehag@ee.kth.se

in pdf format (only), with all documents merged into one single pdf-file. Please write “Master thesis project L2b” in the subject line.

Deadline for application is August 13th, 2012.

General information:

The master thesis project will be performed at the department of Electric Power Systems at KTH. The student will receive a payment of 35850 SEK when having finalized the Master thesis project and an international conference paper.

Contact:

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References:

[1] Stockholm Royal Seaport, Retrieved January 9, 2012, from <http://www.stockholmroyalseaport.com/>

[2] Stockholms stad, Norra Djurgårdsstaden Stockholm Royal Seaport – Vision 2030. Sundbyberg: Alfaprint, 2009. Only available in Swedish.

[3] Christer Bergerland, Knut Faber, and Olle Hansson, Norra Djurgårdsstaden - Nya marknadsmodeller för engagerade kunder, Elforsk report 11:66, 2011. Only available in Swedish

[4] Yalin Huang and Henrik Olsson, Market concepts and the regulatory bottlenecks for smart grids in the EU regulations, Master thesis, KTH, 2011

[5] Ongoing Master thesis work on evaluation methods for market models applied on smart grids, project within the Stockholm Royal Seaport project.

Published: 2012-05-31